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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/988,686	12/11/97	KONECNI	A TI-22166

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EXAMINER	
EATON, K	
ART UNIT	PAPER NUMBER

2823

DATE MAILED:

04/25/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

08/988,686

Applicant(s)

KONECNI ET AL.

Examiner

Kurt M. Eaton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/13/01 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 21-26, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 4-171744.

In re claim 21, Japanese Patent No. 4-171744 shows in Figures 1 and 2, and related text, an electronic device having a first electrically conductive structure (3) connected to a second electrically conductive structure (5) situated over a semiconductor substrate (1), the method including the steps of forming the first electrically conductive structure; forming an insulating layer (4) extending above the first electrically conductive structure, wherein the insulating structure has an opening with sidewalls and a bottom and exposing a portion of the first conductive structure; providing a halogen

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free gas including hydrogen incorporated within a plasma into the opening in the insulating layer and onto the exposed portion of the first conductive layer to increase the reactive surface of any residual material on the exposed portion and at least partially remove the residual material; and then depositing a conductive material into the opening and onto the exposed portion.

Japanese Patent No. 4-171744 does not show wherein the conductive material deposited into the opening and onto the exposed portion is deposited using chemical vapor deposition.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to deposit the conductive material deposited into the opening and onto the exposed portion using chemical vapor deposition since chemical vapor deposition is a known method by which the aforementioned conductive material may be conformally deposited into openings formed in insulating layers and the selection of a known conductive material deposition method on the basis of its suitability for the intended use involves only routine skill in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed conductive material deposition process or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen conductive material deposition processes or upon another variable recited in a claim, the applicant must show that the particular conductive material deposition processes are critical.

In re claim 22, Japanese Patent No. 4-171744 shows wherein the gas additionally includes an inert gas.

Japanese Patent No. 4-171744 does not show wherein the inert gas includes helium.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the inert gas included in the gas of Japanese Patent No. 4-171744 as helium since helium is a known gas which is chemically inert and has mass. Accordingly, one of ordinary skill in

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the art would hold obvious the fact that helium can be bombarded onto material and that the bombardment can at least partially remove units of material. By at least partially removing units of material through helium bombardment, helium can increase the reactive surface of the material.

In re claim 23, Japanese Patent No. 4-171744 shows wherein the gas additionally includes argon.

In re claim 24, Japanese Patent No. 4-171744 shows wherein the conductive material includes a metal selected from the group of aluminum, copper, titanium, and a combination thereof.

In re claim 25, Japanese Patent No. 4-171744 shows wherein the gas including hydrogen incorporated within the plasma removes residue formed in the opening in the insulating layer.

In re claim 26, Japanese Patent No. 4-171744 substantially discloses the invention as claimed but fails to show wherein the plasma has a plasma power of from about 150 W to about 450 W.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the plasma of Japanese Patent No. 4-171744 with a plasma power of from about 150 W to about 450 W since the power at which a plasma is generated from is a well known processing variable and the discovery of the optimum or workable plasma power range involves only routine skill in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed plasma power or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen plasma powers or upon another variable recited in a claim, the applicant must show that the particular plasma powers are critical.

In re claims 29 and 30, Japanese Patent No. 4-171744 shows wherein the step of providing a gas into the opening is at a temperature from about 100 °C to about 450 °C.

4. Claims 27, 28, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 4-171744 as applied to claims 21 and 26 above, and further in view of Pan.

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In re claims 27 and 28, Japanese Patent No. 4-171744 substantially discloses the invention as claimed but fails to show wherein the plasma has a bias power up to about 300 watts.

Pan teaches that a bias power from about 20 to about 1000 watts is applied to a plasma used to etch a material in order to provide a more anisotropic and directional etch perpendicular to the surface of the substrate {column 6, lines 16-30}.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a bias to the plasma of Japanese Patent No. 4-171744 since, as evidenced by Pan, a biased etching plasma would provide a more anisotropic and directional etch perpendicular to the surface of the substrate thereby increasing the effectiveness at which Japanese Patent No. 4-171744 the gas including hydrogen could be delivered to the surface of the substrate at the bottom of the opening. It also would have been obvious to bias the plasma of Japanese Patent No. 4-171744 in view of Pan using a power up to about 300 watts since a plasma biasing power level is a well known processing variable and the discovery of the optimum or workable biasing power involves only routine skill in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed plasma biasing power or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen plasma biasing powers or upon another variable recited in a claim, the applicant must show that the particular biasing powers are critical.

In re claims 31 and 32, Japanese Patent No. 4-171744 shows wherein the step of providing a gas into the opening is at a temperature from about 100 °C to about 450 °C.

Response to Arguments

5. Applicant's arguments with respect to claims 21-32 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

6. Paper related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication of earlier communication from the examiner should be directed to **Kurt Eaton** at **(703) 305-0383** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via kurt.eaton@uspto.gov.



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